

Evaluation of Position Description

Labor Category/FLSA: Nonexempt

☐ **Current Position Description**
☒ **Proposed Position Description**

Date Prepared: 06/25/03

Approving Official: Name: Carolyn C. London Signature: Carolyn C. London
Title: HR Specialist

Position Title/Series/Grade: Electrician (High Voltage), WG-2810-11

ORGANIZATION: Division of Property Management, NIEHS

SEE THE EVALUATION THAT WAS ATTACHED TO THE PD.

Installation: National Institute of Environmental Health Sciences, National Institutes of Health, Research Triangle Park, NC
Title: Electrician (High Voltage)
Occ Series: 2810
Pay Plan: WG
Grade: 11

Introductory Statement: The Division of Property Management (DPM) serves all of the NIH Community by providing support for renovations, new construction and maintenance of existing facilities, utilities and grounds. The Division provides professional leadership for the engineering programs of the National Institutes of Health (NIH). The scope of DPM operations is such that the effectiveness with which they are carried out has a major and direct effect on the worldwide biomedical research programs of the NIH. In addition to the main facilities at the Bethesda Campus and in Poolesville, MD, NIH has facilities at Research Triangle Park, North Carolina, Rocky Mountain Laboratory in Montana and the Gerontology Research Center in Baltimore, MD. This position is organizationally and physically located within the DPM organizational subcomponent responsible for the provision of real property management services for the NIEHS facilities in Research Triangle Park, NC.

Position is located in the Property Maintenance and Operations group of the NIEHS MEO. This position will have dual responsibility on the NIEHS and EPA Campuses: (1) the installation, testing, repairing and maintenance of high voltage equipment and systems in the Central Utility Plant and throughout the NIEHS and EPA Campuses; and, (2) the distribution and controlling of electrical energy through the primary High Voltage Electrical Distribution System.

The NIEHS electrical distribution system consists of a 100,000 volt to 13,800 volt substation, miles of cable on multiple feeders to transformers in all NIEHS and EPA buildings. The Central Utility Plant houses the following major equipment: two (2) 2,500 ton and four (4) 3,500 ton refrigeration units, five (5) 50,000,000 MMBTU per hour high temperature hot water generators, three (3) medical-pathological and hazardous waste incinerators, and five (5) diesel generators which supply emergency electrical power to the Central Utility plant and the Rall Building, including the animal facilities.

In the event of an electrical power failure to the campus, the High Voltage Electrician has the responsibility for the generation and distribution of emergency power to the Rall Building. The accreditation of the NIEHS animal facilities is dependent upon the reliability of this local emergency generating system.

Electrician (High Voltage), WG-2810-//**I. Introduction**

Position is located in the High Voltage Group, Power Plant Section, Maintenance Engineering Branch, Division of Engineering Services. The High Voltage Group has a dual responsibility on the NIH Reservation; 1) The installation, testing, repairing and maintenance of high voltage equipment and systems in the Power Plant Section and throughout the NIH Complex and 2) The distribution and controlling of electrical energy through the primary High Voltage Electrical Distribution System which is connected to numerous substations and switching stations.

The NIH electrical distribution system consists of three (3) 13,000 volt substations, 30 miles of cable on 35 feeders to 115 transformers in 35 buildings. In addition, at the NIH Animal Center there are 5 miles of overhead and underground cable supplying 13,000 volts to 10 buildings. The Power Plant Section houses the following major equipment: nine (9) 1000 ton and five (5) 3,000 ton refrigeration units, four (4) 150,000 lb. per hour high pressure steam boilers, two (2) Medical-pathological waste incinerators, three (3) high volume air compressors, and two (2) 1,000 KW diesel generators which supply emergency electrical power to Building 10, the Clinical Center.

In the event of an electrical power failure to the reservation, the High Voltage Group has the responsibility for the generation and distribution of emergency power to the Clinical Center. The accreditation of the Clinical Center as a hospital is dependent upon the reliability of this local emergency generating system.

II. Major Duties

As a high voltage electrician the incumbent performs installation and maintenance activities on the most complex electrical distribution system switchgear and equipment with a minimum of guidance or written procedures. Equipment and system switchgear responsibilities include the following: incoming high voltage air circuit breakers, distribution cables, relays used in the high voltage protection scheme, all types of transformers; various types of disconnect, safety, transfer and pressure contact switches, lightning arrestors; low voltage distribution panel and breakers, network protectors; and supervisory systems. Incumbent also dismantles, repairs and assembles synchronous and induction motors, motor generators, exciters and various auxiliary controls within the Heating and Refrigeration Plant. Work assignments usually involve troubleshooting the various electrical components and equipment under live operating conditions, isolating the problem to the particular component or assembly, and performing repairs and adjustments which are often complicated by critical tolerances and the extremely delicate nature of the components.

Incumbent applies an unusually high degree of skill to make modifications and perform tests and calibrations in accordance with manufacturer's engineering bulletins, instructions and procedures which are often vague and incomplete. As a result the incumbent must develop and implement special

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test techniques for use on specific switchgear. Must set up and connect various types of highly sophisticated and technical test equipment such as extremely high current and voltage devices capable of producing over 20,000 amperes or 100,000 volts; measuring resistance down to one micro-ohm; draw and analyze samples of transformer coolant (oil); and analyze and repair breaker faults. Some test equipment required cannot be procured but must be built from scratch. Due to the highly complex nature of the equipment and systems worked on, and because they are usually worked on under live conditions, the incumbent must apply a great degree of manual skill and a high level of concentrated attention for prolonged periods of time to insure that the correct settings and ranges are met. In addition, many components worked on are of unique design or prototype configuration and are of such complexity that the incumbent must apply broad experience and sound judgments in achieving specified calibration, sensitivity, and precise tolerances.

Information obtained during the various tests is compared with acceptable ranges shown in engineering bulletins, time/current curves, charts and other technical manuals. The results are analyzed and appropriate measures taken to insure that proper settings are maintained on all protective equipment. The precise settings are required to guard against costly power outages, work disruption and the possible loss of life or property due to an electrical equipment failure.

Incumbent is also primarily responsible for the distribution and control of electrical energy through a primary distribution system which is connected to a commercial power source. This supplied power serves the ~~NIH Power Plant~~ ^{NIH Central Utility Plant} and numerous substations and switching stations connected to many buildings and facilities whose operations cause wide fluctuations in load demand.

The incumbent operates A/C and D/C switchboards to control and distribute electrical power through the primary distribution system. Activates switches to actuate remotely located circuit breakers, transformers and switches in order to regulate and maintain proper voltage on the feeders by isolating large loads on separate circuits. Connects, disconnects, parallels, or substitutes electrical units or conductors by remote control from the control switchboard. Closely monitors data from wattmeters, voltmeters and ammeters of the distribution feeders. Observes operation of feeder relays and substations.

Since the distribution system is spread over a large geographical area and contains many components and pieces of equipment, the incumbent's supervisor may not be available at all times to provide needed knowledge and expertise. Therefore, incumbent may be required to perform additional duties which are more responsible and require more skill and knowledge than of a journeyman High Voltage Electrician. When incumbent is working at or called to a remote station and indications of deterioration or malfunction are observed incumbent determines, without the aid or technical advice of his supervisor, what actions to take to isolate and bypass the area in order to maintain electrical service. He may shed a portion of the load or make minor repairs. Is thoroughly familiar with the entire system in order that incumbent can decide what work must be done, how high a priority the work has, and whether additional personnel should be called in. Assures that circuits are open and tagged out before any work is started.

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Incumbent operates auxiliary systems located in the Power Plant area such as the emergency generators, air compressors and water pumps. Performs minor maintenance of control equipment such as cleaning and adjusting relays and controls. The incumbent is occasionally assigned to rotating shift duties where he has the same responsibilities and duties as the regular day shift personnel for the proper and efficient operation of substations, transformers, network protectors, relay circuit breakers, electric-driven boiler equipment and refrigeration units. Records in Operating Log all necessary data on electrical generation, motor operation, electrical distribution and similar functions. Under emergency conditions or situations incumbent performs switching operations, sometimes working on distribution systems when they are energized to minimize the chances of a power outage.

III. Skills and Knowledge

Incumbent has the ability to repair, overhaul, install, and modify unusually complex electrical components, devices and sub-systems in any part of the distribution system switchgear or Power Plant. Has the ability to read and interpret complex multiview drawings, sketches, wiring diagrams, manufacturer specifications and other technical material to isolate malfunctions quickly in standard electric power distribution and generating equipment as well as prototype or special purpose devices for which there are no operating or maintenance procedures. Incumbent develops modifications and improvements to standard procedures and work practices, and implements such changes to equipment and operating specifications.

In addition to using a variety of trade tools, measuring devices, and test equipment which is typical of the journeyman level, incumbent has the ability to adapt such tools and devices for special applications such as extending the range or sensitivity of such equipment or manufacturing one-of-a-kind components to accommodate special or unusual configurations. Has the ability to set up, perform and interpret the results of special tests on the basis of broad trade knowledge and experience in the field.

Performs precise adjustment and calibration of special purpose test stands to measure, record and locate such elements as High Potential, Megger, ground faults, high voltage protection and operating integrity of a switch. Incumbent traces and corrects malfunctions in the most unusually complex automatic switching and high voltage protection components, where troubleshooting is complicated because of components performing multiple functions which are interrelated or where performance specifications are met only by simultaneous adjustments and alignments. Malfunctions in these components usually result from the sum of a number of minor deficiencies in several areas rather than one major, easily identifiable defect.

Incumbent has a comprehensive trade knowledge of the operating principles related to the electrical equipment serviced and is familiar with the functional relationships and the impact of repairs on all of the related devices worked on. Is thoroughly familiar with the make-up, operation and installation of a wide variety of electrical systems, circuits, equipment and controls of a complex nature and with the National Electric Code. In order to meet the

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more difficult requirements of maintaining and operating the distribution system, in a safe and efficient manner, the incumbent must apply a greater practical knowledge of the various gauges, sizes and types of wire, conducts, couplings, high voltage protection schemes, safety switches, cable testing, network protectors and other electrical devices. The wide variety and complexity of the equipment worked on is complicated further by many differences in manufacturers' tolerances and specifications. Therefore the incumbent is highly knowledgeable of the equipment furnished by all manufacturers to insure that proper test procedures are followed and appropriate engineering bulletins and data used to effect their proper calibration. This includes a wide range of electrical values in addition to the mechanical or physical tolerances which must be maintained.

IV. Responsibility

The National Institutes of Health's responsibility for the care and well being of ~~patients in the Clinical Center~~ ^{patients in the NIH's animal facility} and the protection of experimental works in progress is heavily dependent on the skills and responsiveness of the ~~personnel in the High Voltage Electrical Shop~~ ^{Electrician} on an around-the-clock basis. Therefore incumbent is subject to call-ins during all non-duty work hours to take care of unexpected problems or an emergency situation. Is required to report for duty when so requested by a supervisor of the ~~Power and Operations Group~~ ^{Power}. Is considered essential personnel and during temporary closing-of-work places, situations due to hazardous weather conditions or other emergency situations where incumbent is expected to report for duty at the regularly scheduled time or remain at the work site until relieved from duty.

Incumbent receives work assignments from the supervisor in the form of work orders and oral instructions. Works in accordance with available drawings, technical orders, or specifications, and often calculates and identifies missing dimensions or tolerances to be inserted in work orders. Work assignments require a great deal of independent judgment and decisions regarding the methods and procedures for completing assignments. Tasks often involve extending the use of conventional tools and equipment and improving special techniques and procedures to attain desired results or one-time test parameters. Incumbent is responsible for knowing and judging the impact of repairs performed and the effect that changes and adjustments made will have on the related integral components of the system serviced. Is also responsible for making further tests and calibration to insure that the equipment or devices are operating and functioning precisely to obtain the desired results under all conditions.

Incumbent independently plans the work sequence and determines the requirements for serviceability of the equipment in the remote locations of the NIH distribution system. Is also responsible for applying sound judgment and making decisions which contribute toward greater accuracy, efficient repairs maintenance operations. He keeps abreast of the latest technological changes in the craft trade, and provides technical guidance and assistance to lower graded workers. Due to the high voltages involved in the distribution system, the incumbent exercises extreme caution and observes all safety regulations when working on the system to insure the safety of all personnel, including himself at all times.

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Incumbent's supervisor is available to provide advice on unusually difficult problems and completed work is subject to spot check for compliance with accepted trade practices.

V. Physical Efforts

Incumbent works both indoors and outdoors. Is required to be on one's feet most of the tour of duty; the work requires considerable walking, climbing ladders, bending, stooping and crawling to inspect equipment. Kneels, stoops, crouches, and stands for long periods of time. Must be well coordinated in using eyes, hands, legs, and body in installing, repairing and testing electrical equipment in confined spaces and awkward locations.

VI. Working Conditions

Incumbent works on and around equipment operating at high voltage. Is exposed to various degrees of temperature, to grease, oil, fumes, dirt and dust. At times is required to work in awkward and cramped positions. A majority of the working time is spent in high voltage vaults or around electrical equipment that is energized. Handles oil (transformer coolant, PCB) and compounds which may be toxic and difficult to work with.

In order to have switchgear and other control items available for testing and related work, it may be necessary to do work at night or on weekends. Therefore, working hours and days for personnel assigned to this shop may change according to work requirements and circumstances encountered in the buildings. At times, incumbent may be assigned to a rotating shift.

Identification: Electrician (High Voltage)

Location: Position is located in the High Voltage Group, Power Plant Section Maintenance Engineering Branch, Division of Engineering Services

Nature of Action: Redescription of Electrician (High Voltage)
WG-2810-11, PD# OA-732

Series and Title Determination: The incumbents have dual responsibilities (1) installing, testing, repairing and maintaining the high voltage equipment and systems for the NIH Power Plant System, including the NIH Animal Center, Poolesville, Maryland; and (2) distributing and controlling of electrical energy by the primary High Voltage Electrical Distribution System. Therefore, this will be titled Electrician (High Voltage), WG-2810.

Standard Used: Job Grading ^{2nd of 95} Standards for Electrician (High Voltage)
WG-2810, dtd. ~~June 1973~~, and for Electronics Mechanic
WG-2614, dtd. June 1971.

Analysis and Evaluation: The duties of this position were thoroughly investigated through interviews with the Chief, MEB, Chief, PPS, and the Section Chief of the High Voltage Group. Also, an on-site visit of the primary distribution system and various sub-stations was conducted. The NIH Distribution System on the main campus consists of three 13,000 volt substations, thirty miles of cable on thirty-five feeders to 115 transformers in thirty-five buildings. This position also has responsibility for the NIH Animal Center, Poolesville, Maryland, which consists of five miles of overhead and underground cable supplying 13,000 volts to ten buildings. In addition to the Distribution System, the position is also responsible for all electrical operations of the Power Plant Section. This equipment encompasses fourteen refrigeration units; five consisting of 3,000hp and nine consisting of 1250hp, four 150,00 lb. per hour high pressure steam trailers, two Medical-pathological waste incinerators, three high volume air compressors, and two 1,000 KW diesel generators which supply emergency electrical power to the Clinical Center.

Due to the size and complexity of the NIH Reservation, there are three primary Distribution Systems located throughout the reservation, (Bldg. 17, Bldg. 46 and Bldg. 53), and one primary System for air conditioning, chill air, and heating located in Bldg. 11. The Supervisory Board (located in Bldg. 11) monitors the conditions of all primary distribution and conductors governing NIH'S power. The high voltage group has total responsibility for all these systems. The incumbents of this position must perform installation and maintenance on one of the most complex electrical distribution systems and switch-

gear equipment. This responsibility includes incoming high voltage air circuit breakers, distribution cables, relays used in high voltage protection schemes, transformers, transfer and pressure contact switches, low voltage distribution panel and breakers, network protectors, and supervisory systems. The incumbents are also responsible for the dismantling, repairing, and assembling synchronous and induction motors, generators, exciters and various auxiliary controls within the Heating and Refrigeration Plant.

Supplying electrical power to NIH is considered to be a more complex task than supplying power to residential homes, stores, or regular office buildings. Since NIH is a biomedical research institution its electrical requirements are unique, complex, and critical. For example, the ~~Clinical Center and ACR buildings~~ ^{NIH's Arroyo Building} house ~~patients~~ ^{animals} and it is critical that power be supplied at all times due to life and death circumstances. The job grading standard does not describe responsibilities for these types of complexities. It is the opinion of this classifier that responsibility for maintaining the type of systems described above is greater than the highest level illustrated in the standard. Further, similar systems elsewhere are usually serviced by the electrical power company.

The power generating equipment and the emergency power systems in use at NIH supply emergency power to the areas of critical patient care, research laboratories and the computer center. The system is designed to automatically switch over emergency operations as required. The NIH system consists of a complete panel board at the generators as well as the switchgear which is hooked up, set, and calibrated by the high voltage crew so that it receives signals in connection with lost and regained power to assure that a constant supply of electricity is continually and automatically fed to these critical areas.

The DC battery bank power systems, maintained and tested by the high voltage crew, supplies control potential for the breakers at the substations. The DC power to the switchgear emanates from batteries. Loss of control potential would prevent tripping capability of the main breakers which could mean a blow up of switchgear with possible loss of power to the entire NIH site. This type of responsibility is not specifically included in the job grading standard. However, these complexities are greater than contemplated at the highest levels of the standard.

The automatic switchgear and network equipment involves electronic equipment which the high voltage electrician is responsible for maintaining and repairing. These duties were compared to the Electronics Mechanic, WG-2614 Job Grading Standard and significant comparability exists between the duties performed by the incumbents of this pos-

ition and the duties performed by the Electronics Mechanic through the WG-11 level in the Standard (pages 5 and 6).

In the steam, air conditioning, and refrigeration area there are five 3,000hp refrigeration units and nine 1250hp refrigeration units maintained by the high voltage crew. Responsibilities include taking care of the five 4160 volt switches and the nine 2400 volt switches which control the motors and the relays, including the overtemperature or temperature control relay which protects the motor, 4160-volt breaker, 1300 and 4160 volt transformers. It is true that the high voltage standard covers work on electrical systems having voltage above 550; however, the 4160-volt equipment and the 13000 volt equipment maintained by this unit, as well as the 1300-volt feeders which are used almost exclusively in the NIH network distribution system represent complexities beyond the upper limits of the job grading standard.

Conclusion: Job assignments are significantly broader and more complex and Job Knowledges required are more substantial than those described at the journeyman level of the job grading standard, which illustrate responsibilities, duties, and abilities necessary to performance by general electricians. This coupled with the comparison to the WG-11 level in the Electronics Mechanic, (WG-2614) job grading standard, substantiate the justification for classification of this position as Electrician (High Voltage), WG-2810-11.

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Date 11/2/02

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